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(54) Title: BATTERY WITH VIBRATION-RESISTANT JOINT BETWEEN POSITIVE ELECTRODE AND CURRENT CARRYING STRAP

(57) Abstract: A method of manufacturing a battery includes as an initial step providing a cell for a battery having alternating positive and negative electrode plates, wherein each of the electrode plates is separated by an electrically insulative separator layer. Each of the positive and negative electrode plates includes a projecting tab extending from an adjacent upper portion thereof, the projecting tabs of the positive plates being generally aligned, and the projecting tabs of the negative plates being generally aligned. Next, the method comprises attaching a conductive connecting strap to the projecting tabs of the positive and negative plates. The method then comprises applying a cap material onto the connecting positive strap and allowing the cap material to spread and drip to the exposed portions of the projecting tabs and the adjacent upper portions of the negative and positive plates and separator material. The cap material is allowed to harden to provide a cap attached to the projecting tabs and the adjacent upper portions of the positive plates and negative plates and separator material.



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# INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 H01M2/28

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 H01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 944 120 A (CHLORIDE IND BATTERIES LIMITED) 22 September 1999 (1999-09-22) paragraphs '0017!-'0021!; example 2	1-19
X	US 4 509 253 A (EBERLE KELLY L) 9 April 1985 (1985-04-09) column 3, line 60 - line 66 column 4, line 33 -column 5, line 63 figures 2,7	1-19
X	EP 0 314 318 A (GATES ENERGY PRODUCTS INC) 3 May 1989 (1989-05-03) column 3, line 34 - line 51 column 9, line 48 -column 10, line 37 example 6C	1-19

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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 841 915 A (EBERLE W) 15 October 1974 (1974-10-15) column 6, line 43 -column 8, line 2 examples 7,9A-9F ---	1-19
X	PATENT ABSTRACTS OF JAPAN vol. 2000, no. 24, 11 May 2001 (2001-05-11) & JP 2001 185206 A (SHIN KOBE ELECTRIC MACH CO LTD), 6 July 2001 (2001-07-06) abstract ---	1-19
X	PATENT ABSTRACTS OF JAPAN vol. 017, no. 272 (E-1371), 26 May 1993 (1993-05-26) & JP 05 013066 A (JAPAN STORAGE BATTERY CO LTD), 22 January 1993 (1993-01-22) abstract ---	1-19
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 12, 26 December 1996 (1996-12-26) & JP 08 222199 A (SHIN KOBE ELECTRIC MACH CO LTD), 30 August 1996 (1996-08-30) abstract ---	1-19
X	PATENT ABSTRACTS OF JAPAN vol. 013, no. 123 (E-733), 27 March 1989 (1989-03-27) & JP 63 291361 A (SHIN KOBE ELECTRIC MACH CO LTD), 29 November 1988 (1988-11-29) abstract ---	1-19
A	EP 0 734 084 A (MATSUSHITA ELECTRIC IND CO LTD) 25 September 1996 (1996-09-25) abstract; figures -----	12,13

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 03/11719

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0944120	A	22-09-1999	EP 0944120 A2 22-09-1999
		GB 2335537 A ,B 22-09-1999	
		US 6395421 B1 28-05-2002	
US 4509253	A	09-04-1985	NONE
EP 0314318	A	03-05-1989	US 4780379 A 25-10-1988
		AT 120037 T 15-04-1995	
		AU 2288788 A 13-07-1989	
		BR 8805126 A 16-05-1989	
		CA 1309457 C 27-10-1992	
		DE 3853334 D1 20-04-1995	
		DE 3853334 T2 27-07-1995	
		EP 0314318 A2 03-05-1989	
		ES 2070130 T3 01-06-1995	
		JP 1243380 A 28-09-1989	
		JP 1927248 C 25-04-1995	
		JP 6054678 B 20-07-1994	
		KR 9208406 B1 28-09-1992	
		MX 165900 B 09-12-1992	
US 3841915	A	15-10-1974	NONE
JP 2001185206	A	06-07-2001	NONE
JP 05013066 6	A	16-10-1975	NONE
JP 08222199 6	A		NONE
JP 63291361 6	A		NONE
EP 0734084	A	25-09-1996	JP 3211614 B2 25-09-2001
		JP 8255608 A 01-10-1996	
		DE 69517003 D1 21-06-2000	
		DE 69517003 T2 18-01-2001	
		EP 0734084 A1 25-09-1996	
		KR 192098 B1 15-06-1999	
		US 5776207 A 07-07-1998	